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16. Abstract

This report constitutes an aid to persons or groups who must create or revise railroad operating rules. It provides guidance for avoiding confusion, ambiguity and misconceptions in the wording of rules. Content, style and organization are discussed, with illustrations of both desirable and undesirable practices taken from current codes of operating rules.

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1. INTRODUCTION

These guidelines have evolved from our experience at Transportation Systems Center in analyzing the contents of railroad operating rules. We think we learned some facts and developed some ideas that may be of value to others; so we share them with you in these guidelines for whatever value they may have.

Claims have frequently been made that some railroad operating rules are confusing, conflicting, ambiguous, hard to understand, hard to obey and hard to enforce, and that these difficulties can lead to railroad accidents. These claims were recently summarized and examined by the NTSB[1], who recommended that "...the Federal Railroad Administration develop operating rules ... which are free of vagueness and which specify definitely the circumstances and action to be taken." The NTSB reiterated and strengthened this recommendation in a subsequent study.[2] It is hoped that these guidelines will be a step in the recommended direction.

Our comments are aimed at the person (or persons) who must improve old rules and create new ones. Our recommendations are offered in a constructive sense, and with deep respect for the many writers who have already made codes of operating rules that have given American railroads an enviable record of safety. No matter how good a code is, however, it can always be improved. In general, we have attempted to choose both our "good" examples and our "bad" examples from existing rules. Our "good" examples are chosen to illustrate a

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[1] "Special Study: Signals and Operating Rules as Causal Factors in Train Accidents," Report Number: NTSB-RSS-71-3, December 2, 1971.

[2] "Special Study: Train Accidents Attributed to the 'Negligence of Employees.'" Report Number: NTSB-RSS-72-1, May 24, 1972.

point. We never imply that they are best; only the experienced rules specialist can make that determination.

Perhaps our aim can best be summarized by quoting AAR Rule 108: "In case of doubt or uncertainty, the safe course must be taken." We hope that this effort will help provide rules in the future that will reduce instances of "doubt or uncertainty."

Our comments will be centered around three topics:

Contents

Style

Organization.

2. CONTENTS

2.1 General Comments

A good rule, when learned and understood, should condition the user to respond immediately to a situation with an appropriate course of action. If the necessary information is not present in the rule, the appropriate response cannot be expected. These guidelines will not attempt to suggest what provisions a rule should contain -- that is the province of operational experts. Rather, we will suggest the kinds of contents necessary to assure a rule's effectiveness.

Once a rule has been drafted, a number of questions should be asked about what it says:

What action is required?

Who is responsible?

Who has authority?

When, where, under what circumstances does this rule apply?

What are the critical words? Is their meaning clear?

What other rules modify or augment this rule?

What exceptions may be made to this rule?

Each question introduces a topic that will be discussed below:

Procedure

Responsibility

Authority

Criteria

Definitions

Cross-references

Exceptions

2.2 Procedure

The principal reason for publishing a rule is to help people determine what to do in a given situation. The more clearly and unambiguously the rule spells out appropriate action, the more effective it will be. Therefore, in writing a rule, ask yourself: "What do I want the reader to do?" "Will he know what to do after reading this rule?"

Procedures should be stated positively and concisely, avoiding vague phrases. (Techniques for avoiding vagueness are discussed below under Style.)

Consider the following rules:

Examples

209[1]. Operators receiving train orders must write or typewrite them in manifold during transmission. They must retain a copy of each train order. The word "Complete," the time, and the signature of the operator must be in his handwriting.

315. A block record must be kept at each block station.

84. A train must not start until the proper signal is given.

Rule 209 tells clearly who must do what, when, and how. On the other hand, Rule 315 does not explain who is responsible for keeping a block record, what information must be entered, when entries must be made, etc. Anyone needing to know what to do about a block record would have to look elsewhere for the information. Likewise, Rule 84 does not explain what a "proper" signal is, who is to give the signal, who is to receive the signal, or who is to start the train. Anyone needing to start a train would have to look elsewhere for the information. More information on procedure, responsibility, and authority would greatly increase the value of Rules 315 and 84. If the necessary information exists elsewhere in the book, cross-references may be used effectively.

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[1] Rule numbers refer to the AAR "Standard Code of Operating Rules."

2.3 Responsibility

If you want to be sure someone will obey the rule you are writing, you should make it clear who has the responsibility. Generally this should be done by naming the job title of the person responsible, such as: conductor, engineman, dispatcher, crew member, etc. Failure to establish responsibility, or spreading responsibility among too many people, can result in everyone's assuming that someone else is doing what the rule prescribes. There are numerous rules establishing responsibility scattered throughout the AAR Code; Rule 34 is a good example:

> 34. All members of the crew in cab of engine must, and other members of crew will, when practicable, communicate to each other by its name the indication of each signal affecting the movement of their train or engine as soon as it becomes clearly visible. It is the responsibility of the engineman to know that these requirements are complied with in cab of engine.

There are many other instances where responsibility is implied but not specifically assigned. For example, Rule 20:

> 20. Unless otherwise provided, all sections except the last will display two green flags, and, in addition, two green lights by night in the places provided for that purpose on the front of the engine.

Rule 20 tells what must be done, but it does not assign the responsibility for doing it. If the information is specified elsewhere, it should be cross-referenced. Danger signals that definition of responsibility may be needed include the use of impersonal subjects or the passive voice. The definitive sentence of Rule 20 has "sections" as a subject -- yet the "section" can neither place signals nor check for their presence. Many rules that start, "Trains or engines must ...," might better state, "The engineman must...." Similarly, passive statements, "Switches must be properly lined...," might better read, "A train crew member must properly line switches...."

Because so many rules do, or should, specify responsibility, it would be a good idea to provide an index to rules of responsibility somewhere in your book, so that one can look up "Conductor" (for example) and find listed the numbers of all rules assigning responsibilities to conductors.

2.4 Authority

To avoid complete chaos in operations, clearcut authority to initiate certain actions must be established and adhered to. Many operating rules have been written to assure safety in operations by establishing and invoking authority. When clearly stated, these rules are the foundation for safe, orderly practices. However, when they are vague, rules involving authority are particularly dangerous. For lack of a clear understanding of authority can lead either to the paralyzing failure to take a necessary action because of fear that it is unauthorized, or to the dangerous assumption of unauthorized responsibility and the initiation of unauthorized actions.

The preceding comments on rules about responsibility apply generally to rules about authority. In particular, the person or function having authority should be stated specifically, as in the last sentence of Rule 269:

> ...Further movement must not be made except on signal indication or until authority is received from train dispatcher or control operator.

Contrast this with the following sentence from Rule 509:

> When a train or engine is stopped by a Stop-indication it must stay until authorized to proceed.

Rule 509 sets up a requirement for issuing authority to proceed, but it does not assign the authority to any specific function or person and thus leaves the way open for unauthorized movement of a train. Other examples of vague references to authority are:

> 622. Operator must not make nor permit any unauthorized repairs, alterations or additions to the interlocking.
>
> 634. Operators must not permit unauthorized persons to enter and loiter in the interlocking station.

These rules are good as far as they go; they just don't go far enough. If authority is defined elsewhere, a cross-reference to the definition of authority would make a vague rule much more effective. But if authority is not defined, then the rule can contribute little to safety and may, by introducing confusion, be a danger.

If a specific procedure is required to grant authority, the details should be specified in the rule. Part of the vagueness of Rule 634, for example, results because the rule does not tell how to distinguish between authorized and unauthorized persons. In contrast, Rule 278 not only tells who can give authority but exactly how it should be done:

> 278. Authority to use an electric locked switch which is under the control of the control operator, must be given verbally to member of crew by train dispatcher or control operator. The period of time the switch and track may be used and designated limits must be clearly stated and understood.

As with rules on responsibility, it would be desirable to prepare a special index in your rule book to rules assigning authority.

2.5 Criteria

Criteria are standards for judgment In the case of operating rules, criteria are those provisions within the rule that help the reader determine: "When?" "Where?" "How?" "What?" "How much?" They define the conditions under which the rule applies. They specify what must be done and how to do it. They give the employee a means of knowing when he has fully complied with the rule. Inclusion of specific criteria in the statement of a rule always reduces the chances that the rule will be misinterpreted.

Consider the first sentence of Rule 103:

> 103. When cars are pushed by an engine, and the conditions require, a member of the crew must take a conspicuous position *on the leading car*....

The rule starts with one criterion for "When?" but just as we learn that the rule applies when cars are pushed by an engine, we are suddenly let down by "...and the conditions require,...." Now we have to have some other reference that tells what conditions require a man on the leading car and what don't. But that's the objective of the present rule, which is therefore tremendously weakened.

On the other hand, Rule 629 specifies the conditions for its observance.

> 629. If necessary to authorize a train or engine to pass an interlocking signal indicating Stop, hand signal or permission may be given by the operator. Hand signals or permission must not be given until the route has been examined, is known to be safe for the passage of trains, and until after the train comes to a stop at the home signal. Such occurrence must be reported to the_____.
>
> At interlockings where distances make it impracticable for operator to examine routes and give hand signals, members of crew must be governed by instructions from operator, examine route and operate switches by hand as directed before proceeding.

The circumstances under which the rule applies are clearly stated, and no doubt is left as to when and where the rule holds.

Other criteria specify "how" a rule is to be carried out. Consider Rule D-152:

> D-152. When a train or engine crosses over to, or obstructs another track, the movement must be protected, unless otherwise specified.

This rule gives no guidance on how to protect the movement. If the "how" has been established in another rule, a simple cross-reference will suffice. Many rules include useful criteria for determining how to go about the job. For example:

> 621. Operators must observe, as far as practicable, whether the indications of the signals correspond with the positions of the levers.

An operator is told what to compare and given a criterion of a match between signal indication and lever position that leaves no doubt in his mind as to what is required.

The criteria for "What?" have been discussed above under "Procedure" and need not be amplified here. "How much?," however, is a frequently neglected criterion that deserves a lot of attention. The following sentence from Rule 99 has probably received more criticism than any other statement in any set of railroad rules:

> ...When a train stops under circumstances in which it may be overtaken by another train, a member of the crew must go back immediately with flagman's signals a sufficient distance to insure full protection...."

How does a flagman know what a "sufficient distance" is? It is claimed that circumstances vary so much that it is impossible to specify a distance -- that "sufficient" must be left to the judgment of the flagman. However, the circumstances most critical to judging a safe stopping distance are unknown to the flagman. These factors are the power, weight and speed of the overtaking train. The flagman can only assume the upper allowable limits to these factors and allow for them; yet these limits could be specified in the rule. Certainly Rule 99 could be made much more effective by including such provisions as a minimum flagging distance that would always be observed and a set of distances to be added as a function of speed limit, degree of downgrade on approach, track curvature, weather conditions and the like. A small table of conditions and distances could remove much of the vagueness from Rule 99 and perhaps reduce the frequency of rear-end collisions.

In summary, then, after drafting a rule, ask yourself, "Have I included specific criteria as to when the rule applies, what must be done, and how much must be done?" If not, add the criteria that are needed to assure that the rule will be applied properly and fully.

2.6 Definitions

Every book of operating rules of American carriers has a "Definitions" section in the front, just after the "General Rules." Yet our analyses of rule books have turned up many critical words used frequently in a book but undefined. (On the other hand, some words selected for definition are then used only a few times in the rules.) Any key word that is used in a rule but is undefined sets the stage for as many interpretations of the provisions of the rule as there are interpretations for the word.

The influence of an undefined word can be insidious, operating through another word which it defines. For example, many rules apply to "trains." "Train" is defined at the front of the AAR book, but a key element in the definition is "...displaying markers." Now "marker" does not appear in the definitions, nor is it defined elsewhere in the rules. Rule 19 discusses the use of appliances as markers, yet fails to define the term. Moreover, rules 289 and 291 use the term "marker light" (undefined) to designate the signals for "Permissive" and "Stop and proceed," quite a different meaning. Surely such critical terms for basic concepts should be clearly defined if the rules are to be interpreted unequivocally.

Other terms seem to overlap in meaning, such as "back up" and "reverse," and "conflicting" and "opposing." Rules using these terms provide for critical decisions on the safe movement of trains, yet the precise meanings of the terms are missing. Sometimes different words are used for the same purpose, such as "back into" in Rule 326 and "re-enter" in Rule 515. At other times, the same word is used with several different meanings, such as "marker" (noted above) and "switch."

We highly recommend inclusion of an extensive list of definitions in any book of operating rules, including every word that is critical to the *meaning of any rule*. Such attention to definitions will help you, as a writer of rules, also to avoid the two errors of multiple words for one usage and multiple usage of one word.

2.7 Cross-References

Some of the improvements in rules that we have been advocating seem to imply expansion of a rule book to unwieldy dimensions. The call for more criteria and more definitions gives rise to an image of many more words. However, in many instances a good definition or a good set of criteria can be clearly stated once and used repeatedly through cross-references. This technique is used to good effect in today's rule books. Rule 99, providing for flag protection, is cross-referenced in seven other rules in the AAR book, for example:

> 270. If any part of a train or engine overruns a Stop indication, front of train or engine must be protected immediately as prescribed by Rule 99 and member of crew must communicate with train dispatcher or control operator and be governed by instructions.

There are still other rules where Rule 99 is not referenced but should be, for example, Rule D-152, cited above.

One danger inherent in cross-references should be noted. For instance, Rule 99 has a cross-reference to Rule 14(c) and a note excepting its applicability under certain circumstances. Whenever another rule is cross-referenced to Rule 99, the writer must ask: "Are the reference to Rule 14(c) and the note also applicable to my rule?" That is, when you cross-reference, remember that you carry over <u>all</u> of the provisions of the referenced rule to the rule you are writing, including cross-references in the referenced rule. Try to avoid thus creating long chains of cross-references.

One further caution: a rule liberally referred to in other rules, has a much greater influence on operations than its length would suggest. Thus a *good rule, clearly stated, with adequate criteria, specification of responsibility and authority,* and definition of terms, referenced frequently in other rules, is multiply effective. However, the dangers inherent in a poorly constructed rule are just as effectively spread out through the rules structure by cross-reference. If you set up a rule that will be referenced in other rules, be particularly thorough in making it a good rule.

2.8 Exceptions

In an operation as complex as a railroad, a single rule can seldom apply without variation in all circumstances. Thus we find current books of operating rules frequently stating exceptions along with the provisions of the rule. Many of the most difficult rules to interpret turn out, on examination, to contain a close intermixture of provisions and exceptions. For example:

> Rule 91. Unless some form of block system is used, trains in the same direction must keep not less than ten minutes apart, except in closing up at stations.

Here, within one sentence, we have first an exception (up to the first comma), the rule (up to the second comma), and another exception. Even worse is the format of the first sentence of Rule 400:

> "All employees, except those specifically authorized to do so, are prohibited from making any adjustments to a railroad radio set."

Here, the statement of the rule is started, then interrupted with an exception. Furthermore, the rule is stated negatively. In this case, the exception turns out to be the rule; so why not say:

> "Only employees specifically authorized to do so may..."

A good general rule is to state the basic rule first, clearly and positively. Then separately state the exceptions. We heartily endorse the trend in some rule books to label the exceptions clearly, as in the following example:

> (Union Pacific RR) Rule S-83. A train must not leave its initial station on any subdivision, or a junction, or pass from double to single track, until it has been ascertained whether all trains due, which are superior, have arrived or left.
>
> Exception: This rule does not apply for movement in CTC territory.

3. STYLE

3.1 General Comments

Style is a characteristic mode of expression. Some elements of a style help to inform; others can obscure meaning and confuse intentions. To succeed in generating a set of rules that inform, the writer must seek an informative style. The recommendations that follow evolved from intensive analysis of current operating rules and represent our best guess as to why some rules are unambiguous, while others refuse to yield a clear meaning no matter how we wrestle with them. Style cannot be separated from content; therefore some of the techniques we propose will repeat principles we have already touched upon.

The following discussion will be concerned with five guidelines:

Use simple sentences

Separate basic rules, exceptions and special cases

Use tables and figures

Avoid vague phrases

Avoid using general principles as rules

3.2 Use Simple Sentences

The meaning of a rule must be unequivocal, because a rule that can be misunderstood is useless. The simplest means of conveying information is the simple declarative sentence. Frequently we must complicate this form with modifying phrases and clauses, but often we clutter it up unnecessarily. Often our meaning is clearer if we break up one complex sentence into several simple sentences. Consider these two rules:

> 221. *Unless otherwise provided, a fixed signal must be used at each* train order office, which shall indicate "Stop" where there is an operator on duty, except when changed to "Proceed" to allow a train to pass *when there are no train orders for any train in that direction.* While "Stop" is indicated, trains must not leave without Clearance Form_____.
>
> S-71. A train is superior to another train by right, class or direction.
> Right is conferred by train order; class and direction by timetable.
> Right is superior to class or direction.
> Direction is superior as between trains of the same class.

Doesn't it take some puzzling and rereading to determine just what Rule 221 requires? Is the same true of S-71? The difference between the styles of these two rules is that nearly everything is jammed into one sentence in 221, but individual provisions are given individual sentences in S-71. Note how Rule 221 was rewritten by the Union Pacific RR Co., assigning separate sentences or clauses to individual provisions:

> 221. Where provided, fixed signals of the types prescribed in Rule 222 will be used at train order offices. When there are train orders to be delivered, the train order signal must indicate Stop for the direction of train addressed; when there are no train orders to be delivered, it must indicate Proceed except when displayed at Stop to space trains as provided in Rule 91.

3.3 Separate Basic Rules, Exceptions and Special Cases

As we have already noted, the complexity of railroad operations often requires that a basic rule must have exceptions permitted or must be modified under special circumstances. Probably the principal reason that today's rule books have so many complex sentences is the tendency for the writer to attempt to include the exceptions and special cases in his statement of the basic rule.

A good principle to follow is to write the basic rule as simply as possible. Then list exceptions separately. Finally, provide for special cases in subordinate rules.

Two rules in the AAR code whose style confounds their meaning are Rules 269 and 19. These two rules have been clarified considerably by re-writing in the 1972 issue of the operating rules of the Union Pacific RR Co. Let us examine both versions of both rules.

> 269. When stopped by a Stop indication and communication has failed, train or engine must not proceed, except when not standing between Stop signals at a station, train or engine must move forward under flag protection to a point where they will be between Stop signals at a station, clearing main track when practicable, complying with Rule 275. Further movement must not be made except on signal indication or until authority is received from train dispatcher or control operator.

Too much has been crammed into one sentence here, including the rule and an exception. You can lose track of what refers to what by mid-sentence. At first reading, this rule may seem to state that when communication fails and a train is stopped by a Stop indication, that train must both "not proceed" and also must "move forward under flag protection." Note how much clearer this rule is when the basic rule and the exception are stated separately:

> (Union Pacific RR Co.) Rule 269(a). When stopped by a Stop signal and communication with the control operator has failed, train or engine must not proceed except on signal indication or until communication is restored and authority is received from the control operator.
> Exception: A train or engine stopped by a Stop signal at the entering signal at a station and unable to communicate with the control operator may move forward, when preceded by a flagman, to the leaving signal at that station, clearing main track when practicable.

The second rule to be compared in two versions is Rule 19:

> 19. Appliances will be displayed on rear of every train, as markers, to indicate the rear of the train as follows:
> By day, on engines and cars not equipped with permanent marker units, markers not lighted or markers set for reflecting; on engines and cars equipped with permanent market units, lighted as by night or markers set for reflecting.
> By night, on engines and cars marker units showing red to the rear, lighted or set for reflecting, except when clear of the main track (color lights, no lights, reflectors covered or down, etc.).
> A train not equipped to display designated marker units, will display on rear of train by day, a ____ flag; by night, a ____ light except when clear of main track, a _____ light.
> (Approved appliances, their color, shape and manner of display will be indicated by each railroad.)

This rule so thoroughly intermixes basic rules, exceptions, and special circumstances that it is virtually impossible to determine what the last phrases are referring back to in both the second and third sentences. This rule has been rewritten effectively by many carriers. For example, note how the Union Pacific has first stated the basic rule, then an exception, and then special cases and definitions in subordinate rules.

> (Union Pacific RR Co.) Rule 19. A marker, or markers, must be displayed at the rear of every train. At night markers must display illuminated or reflectorized red indication to the rear.
> Exception: In non-ABS territory at night, a train clear of the main track to permit a following train to pass must arrange markers to display an illuminated or reflectorized green to the rear.
>
> 19(a). In non-ABS territory, when the markers of a train ahead display red to the rear, a following train on the same or adjacent track must approach prepared to stop short of rear of preceding train. If rear of preceding train is clear of track being used, following train must proceed at restricted speed until it can be seen that the entire train ahead is clear of the track being used.
>
> 19(b). The following are authorized for use as markers:
> (a) Marker lamps, unlighted by day, lighted by night.
> (b) Cupola mounted marker lamp on cabooses so equipped, displaying single red or green light to the rear, as required by Rule 19.
> (c) Oscillating red rear end light.
> (d) Where authorized by special instructions, reflectorized metal flags.
> (e) Where authorized by special instructions, battery operated flashing light marker lamps.
>
> 19(c). Red reflectorized disc with hinged cover, applied to cabooses and car body type units, is for emergency use only as marker in case of power failure, or if prescribed markers are not available.
>
> 19(d). When the rear car in a train is not equipped to display the prescribed markers, a red flag by day, and a light or a red reflector by night must be displayed on the rear of the rear car.

3.4 Use Tables and Figures

Frequently a great amount of information can be condensed into a table, a graph, a diagram or a picture. The point need not be belabored; current rule books make effective use of pictures (Rule 12 and the 280's) and tables (Rules

14, 16, and 606). However even greater use of pictorials could be made (see the discussion of Rule 99 under "Criteria," above). If your rule uses such terms as: "...when conditions permit," or "...an adequate distance," consider adding a table of guidelines to permissible conditions or adequate distances. You may not be able to cover every possible case, but your rule is still a greater aid to the man who must make the final judgment.

3.5 Avoid Vague Phrases

Rules stated in indefinite terms seldom help the user to determine a safe course of action. Vague phrases typically appearing in railroad operating rules include:

When circumstances (or conditions) require

Proper intervals (safeguards, procedures, etc.)

Such action as is necessary (or appropriate)

Sufficient distance

When necessary

When safety will permit

When practicable

Each of the phrases above begs for definition. Each is an alerting signal that criteria are needed (see above). It is well worth the effort for the rules writer to stop whenever he finds himself using such terms and ask: "Can I make this rule more specific?"

It is no coincidence that most of the phrases used as illustrations above can be found in Rule 99, that Rule 99 is the most controversial rule in the books, and that numerous accidents are attributed to violation of Rule 99. The more specific you can make every rule you write, the more you will contribute to operational safety.

3.6 Avoid Using General Principles as Rules

Rule 108 says: "*in case of doubt or uncertainty, the safe course must* be taken." This is a very nice principle, but it is of very little help to a user who is trying to determine a safe course of action. It doesn't tell him what to do. Scattered throughout rule books we can find many "rules" that state important principles without contributing any guidance for action. For example:

> 84. A train must not start until the proper signal is given.
>
> 101. Trains and engines must be fully protected against any known condition, not covered by the rules, which interferes with their safe passage.
>
> 315. A block record must be kept at each block station.

When you compose a rule, ask yourself: "Is this a rule or a principle?" If you have a principle, there are several courses of action you may take to improve the rule.

Perhaps all you need is a cross-reference. Rule 315 would be much more useful if "block record" were defined in detail in a "Definitions" section and cross-referenced.

Sometimes the addition of information on responsibility and authority will transform a principle into a rule. Rule 315 could profit from such information. Rule 101 would be much more effective if it clearly stated who has responsibility for determining that a "known condition" is dangerous.

Many vague rules or principles require procedures and criteria. Rule 84 would be a useful guide if a table of conditions and proper signals were added. Rule 101 could be improved by adding a guiding table on types of dangerous conditions to look out for and a procedure for the responsible authority to follow to insure "protection" (such as issuance of a bulletin).

However, in some cases the principle is best retained as a principle. Rule 108 may be such a case. There is nothing basically wrong with a good principle. But, to be effective, principles should be used sparingly and grouped together, either at the beginning of the book or at the beginning of each section. The "General Notice" at the beginning of the AAR book is a set of principles.

As a rule-writer, then, when you find you have drafted a principle, you should decide whether it is of such great general value that it should be labelled a principle and set aside in a prominent place, or whether it should be converted to a rule by increasing its specificity.

4. ORGANIZATION

4.1 *General Comments*

Remembering and applying many items of information (as in operating rules) can be aided considerably by the appropriate organization of the items. For example, it is obvious that it would take longer to memorize this list of words:

a

and

any

can

every

fool

it

make

mind

rule

will

than to memorize the following verse:

Any fool can make a rule,
And every fool will mind it.

At every level of writing (sentence, rule, section, rule book) the effectiveness of the product can be increased by adopting a logical organization. We have already commented on organizing individual rules (basic rule, exceptions, special cases). Now we will discuss the following topics:

Total Organization

Definitions

Indexes

4.2 Total Organization

The simplest principle for organization is to group together the things that go together. But operating rules combine in so many different ways for different circumstances that it is difficult to know which combinations should set the format for the book. The AAR Code is organized under 32 headings, with virtually no subordinate headings. This arrangement is certainly useful for locating topic areas, but it gives no further information on the general structure of the rules system. One heading, "Torpedoes," covers only one rule. At the other extreme, "Manual Block Signal System" covers 35 rules. The sequence of sections is heterogeneous, too. Sections for various types of block systems are interspersed with sections on switches and on radio communications, and "Movement of Trains and Engines" includes a long rule on switches (104) far removed from the sections on "Dual Control Switches" (275) and "Electric Locked Switches" (276-279). Many carriers have used this same arrangement for their rule books, then have added additional sections of rules special to their own operation.

It is not our aim here to rearrange the AAR code. What we do recommend is that, if you are involved in a rewriting or reorganization of rules, give considerable attention to the total organization. An example worthy of study for ideas on organization is the "Uniform Code of Operating Rules" of the Institute for Rapid Transit.[1]

4.3 Definitions

Although this topic was discussed under "Contents," we can't stress enough the importance of expanding the "Definitions" section of your rule

[1] "Uniform Code of Operating Rules," Chapter VI of Moving People Safely: Washington, D.C., Institute for Rapid Transit, May, 1972.

book far beyond the coverage typical of today's books. So many times the safety of an operation hinges on the interpretation of a word in a rule. It costs very little to add definitions, and the returns in safety are incalculable.

Try to identify all the key words in each rule you write. Then define each of those words explicitly. Now check. Have you used the word before (is it in your list of definitions)? Is your present usage compatible with the earlier usage? If not, then either select a different word for one usage, or (if that is not feasible) spell out clearly in your definitions the different meanings the word may have and refer back to the appropriate definition in the rule.

4.4 Indexes

An alphabetical index to topics covered by your rules is almost a "must." Current codes vary considerably. The AAR Code has none. The Western Maryland Railway Company, on the other hand, has 20 pages in its index, with over 50 references per page. An alphabetical index to topics is particularly useful in determining what different rules apply to a given situation, and it partially compensates for having to organize the book into a single framework.

In addition, we repeat our recommendation for special indexes showing rules assigning responsibility and authority to individual job titles (engineman, conductor, brakeman, etc.).

Finally, we recommend indexing to rule numbers rather than to page numbers to maximize the flexibility of usage of the indexes.